

6-6

Study Guide and Intervention

Analyzing Graphs of Quadratic Functions

Analyze Quadratic Functions

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| Vertex Form of a Quadratic Function | <p>The graph of $y = a(x - h)^2 + k$ has the following characteristics:</p> <ul style="list-style-type: none"> • Vertex: (h, k) • Axis of symmetry: $x = h$ • Opens up if $a > 0$ • Opens down if $a < 0$ • Narrower than the graph of $y = x^2$ if $a > 1$ • Wider than the graph of $y = x^2$ if $a < 1$ |
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Example Identify the vertex, axis of symmetry, and direction of opening of each graph.

a. $y = 2(x + 4)^2 - 11$

The vertex is at (h, k) or $(-4, -11)$, and the axis of symmetry is $x = -4$. The graph opens up, and is narrower than the graph of $y = x^2$.

a. $y = -\frac{1}{4}(x - 2)^2 + 10$

The vertex is at (h, k) or $(2, 10)$, and the axis of symmetry is $x = 2$. The graph opens down, and is wider than the graph of $y = x^2$.

Exercises

Each quadratic function is given in vertex form. Identify the vertex, axis of symmetry, and direction of opening of the graph. ^A State if the graph is ^Bskinnier or ^Cwider, ^D(up or down).

1. $y = (x - 2)^2 + 16$

2. $y = 4(x + 3)^2 - 7$

3. $y = \frac{1}{2}(x - 5)^2 + 3$

4. $y = -7(x + 1)^2 - 9$

5. $y = \frac{1}{5}(x - 4)^2 - 12$

6. $y = 6(x + 6)^2 + 6$

7. $y = \frac{2}{5}(x - 9)^2 + 12$

8. $y = 8(x - 3)^2 - 2$

9. $y = -3(x - 1)^2 - 2$

10. $y = -\frac{5}{2}(x + 5)^2 + 12$

11. $y = \frac{4}{3}(x - 7)^2 + 22$

12. $y = 16(x - 4)^2 + 1$

13. $y = 3(x - 1.2)^2 + 2.7$

14. $y = -0.4(x - 0.6)^2 - 0.2$

15. $y = 1.2(x + 0.8)^2 + 6.5$